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Claims

What is claimed is:

1. In a system comprising two communicating devices, a method of communication comprising:
creating information packets, each of which has an assigned known order
number from a plurality of order values;
organizing the order values in a predetermined order which the information
packets must be transmitted and received in;
transmitting the information packets in successive packets solely in
accordance with the predetermined order from a first of the two
communicating devices to a second of the two communicating
devices;
successively checking and verifying that each of the information packets
which is received is being received pursuant to the predetermined
order; and either
(1) accepting in the predetermined order each received information
packet by providing an acknowledge response from the second of the
two communicating devices to the first of the two communicating
devices; or

5 (2) rejecting a specific information packet by providing the acknowledge
response, the rejecting forcing the first of the two communicating
devices to determine which specific information packet was rejected
and to resend the specific information packet which was rejected
until the specific information packet is accepted by the second of the
10 two communicating devices.

2. The method of communication of claim 1 further comprising:
upon the first of the two communicating devices receiving the
acknowledge response indicating acceptance by the second of
15 the two communicating devices of a predetermined
information packet, tracking the plurality of order values to
indicate which of the plurality of order values is a next
expected order value.

20 3. The method of communication of claim 1 further comprising:
detecting at the second of the two communicating devices that the
specific information packet does not have a correct order value
or that there are errors associated with the specific information
packet which was received;

5 sending the acknowledge response to the first of the two
communicating devices indicating said detecting;
responding to the acknowledge response by having the first of the
two communicating devices request the second of the two
communicating devices to transmit a present order value of
10 the second of the two communicating devices; and
forcing the first of the two communication devices to retransfer one
or more information packets beginning with the present order
value provided by the second of the two communicating
devices.

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4. The method of communication of claim 1 further comprising:
detecting at the second of the two communicating devices that no
errors exist associated with the specific information packet
which was received;

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determining that the specific information packet could not be
accepted due to an inability of the second of the two
communicating devices to store the specific information
packet;

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providing the acknowledge response to the first of the two
communicating devices indicating the specific information

5 packet which could not be accepted by the second of the two
communication devices; and
forcing the first of the two communicating devices to retransfer to the
second of the two communicating devices the specific
information packet which could not be accepted by the second
10 of the two communication devices.

5. The method of communication of claim 1 further comprising:
before receiving the acknowledge response, transmitting additional
information packets following the predetermined order and
15 creating an indicator within the first of the two
communicating devices to indicate an order value of a next
information packet to be transferred.

6. The method of communication of claim 1 further comprising:
20 including with the acknowledge response from the second of the two
communicating devices a present value of the order number
which the second of the two communicating devices used to
decide to accept or reject a presently pending information
packet being processed.

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- 5 7. The method of communication of claim 1 further comprising:
- checking for communication errors at the second of the two
- communicating devices by implementing a predetermined
- error checking scheme of the information packets which the
- second of the two communicating devices receives.
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8. The method of communication of claim 1 further comprising:
- implementing the system as a source synchronous system by
- transmitting a clock with the information packets.
- 15 9. The method of communication of claim 1 further comprising:
- clocking the first of the two communicating devices with a first clock
- signal and clocking the second of the two communicating
- devices with a second clock signal, the first clock signal and
- the second clock signal being asynchronous with respect to
- 20 each other.
10. The method of communication of claim 1 further comprising:
- coupling a third communicating device to the second of the two
- communicating devices, the first of the two communicating

5 devices communicating the information packets to the third
communicating device by following the steps of claim 1; and
repeating the steps of claim 1 between the second of the two
communicating devices and the third communicating device,
thereby eliminating delivery responses between the first of the
10 two communicating devices and the third communicating
device.

11. A device for use in a system, the device adapted to transmit and receive
information packets with an additional device, the device comprising:
- 15 assembly circuitry for creating and transmitting information packets,
each of which has an assigned known order number from a
plurality of order values, and organizing the order values in a
predetermined order which the information packets must be
transmitted and received in;
- 20 acknowledgement circuitry for receiving responses from the
additional device indicating whether the additional device
successfully received an information packet of correct order
value;
- 25 tracking circuitry coupled to the acknowledgement circuitry and the
assembly circuitry for maintaining an indication of a current

5 order value of an information packet which is to be next
approved by the additional device and an indication of a next
order value of an information packet which is to be next
transmitted, the tracking circuitry controlling the assembly
and transmission of information packets by the assembly
10 circuitry;

parsing circuitry for receiving information packets from the
additional device, the parsing circuitry separating a data field
from an order number field of each of the information packets;
comparison circuitry coupled to the parsing circuitry for comparing a
15 received order number with an authorized order number for a
next authorized information packet to be received;
error detection circuitry coupled to the parsing circuitry for receiving
the data field of each of the information packets and
determining whether any data errors exist, the error detection
20 circuitry providing an error signal in response to detection of
an error;

storage and logic circuitry for determining if resources exist to store
the next authorized information packet to be received and for
storing the next authorized information packet;

5 acknowledge circuitry coupled to the comparison circuitry, to the
error detection circuitry and to the storage and logic circuitry,
the acknowledge circuit providing an acknowledge response
to the additional device indicating whether the next
authorized information packet was received, had no errors
10 and could be stored.

12. The device of claim 11 further comprising:

an outbound information packet queue coupled to the assembly
circuitry for storing data portions of information packets prior
to transmission;

and wherein the storage and logic circuitry further comprises an
inbound information packet queue for storing data portions of
received information packets upon approval of a received
information packet by the acknowledge circuitry.

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13. The device of claim 12 wherein the information packets each comprise a first
field which comprises the plurality of order values, a second field which
comprises an attributes field, and a third field which comprises a data field.

5 14. The device of claim 12 wherein the tracking circuitry further comprises a scoreboard register, the scoreboard register having a storage location for each of the plurality of order values, a first pointer value which indicates an expected order value to be next acknowledged by the acknowledge response, and a second pointer value which indicates a next order value to
10 be used in connection with a transmitted information packet.

15 15. A method of communicating information packets between a transmitting device and a receiving device, comprising:
ordering the information packets in a predetermined order to be
transmitted and received;
transmitting the information packets solely in the predetermined
order from the transmitting device to the receiving device;
receiving the information packets solely in the predetermined order
with the receiving device and successively checking each
20 received information packet to determine if each information
packet can be accepted;
providing a response from the receiving device to the transmitting
device, the response indicating if transmitted information
packets are accepted;

5 if a response indicates a rejected information packet due to the
receiving unit detecting an error associated with the rejected
information packet, sending a request from the transmitting
unit to the receiving unit for an order number of the rejected
information packet and resending information packet
10 transmission beginning with the order number of the rejected
information packet;

if a response indicates a rejected information packet due to the
receiving unit being unable to accept the rejected information
packet although no specific error associated with the rejected
15 information packet was found, sending a response to the
transmitting unit indicating rejection was due to being unable
to accept the rejection information packet and forcing the
transmitting unit to back up to the rejected information packet
and retransmit the rejected information packet.

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16. The method of claim 15 further comprising:

using a scoreboard register in the transmitting device to indicate
what ordering value is associated with a next response from
the receiving device associated with a transmitted information

5 packet and to indicate what ordering value is associated with a
next information packet transmission.

17. The method of claim 15 further comprising:

10 providing a receiving unit with the transmitting device, the
receiving unit functioning to receive information
packets as the receiving device does; and
providing a transmitting unit with the receiving device, the
transmitting unit functioning to transmit information
packets as the transmitting device does,
15 wherein information packets are bidirectionally communicated
between the transmitting device and the receiving device.

18. The method of claim 15 further comprising:

clocking the transmitting device with a first clock;
20 clocking the receiving device with a second clock which is
asynchronous with first clock.

19. The method of claim 15 further comprising:

before receiving a response from the receiving device regarding a
25 first transmitted information packet, transmitting one or more

5 additional information packets in predetermined order to the receiving device.

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